

# Miniaturized Radiation Hardened Beam-Steerable GPS Receiver Front End, Phase I

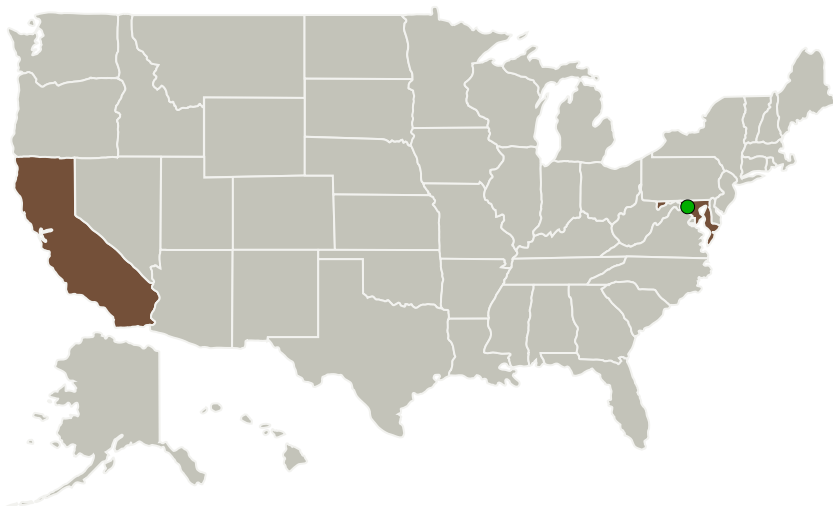
Completed Technology Project (2011 - 2011)



## Project Introduction

NASA is seeking proposals for innovative research in the areas of on-orbit positioning, navigation, and timing (PNT). Tahoe RF is proposing to build a fully integrated radiation hardened beam steerable GPS receiver front end system that will support NASA's requirements for onboard navigation systems for on-orbit near-earth missions. This frontend system, termed "BeamDirect", will not only provide NASA with a software configurable radio receiver for all of the GPS frequency bands, but will also provide ability to do beamforming and beamsteering under software control. Tahoe RF is uniquely positioned to develop this system for NASA for two reasons. First, Tahoe RF has a proven core competency for the design of high performance multiple integrated GPS receivers on a single die. Second, Tahoe RF has recently demonstrated the feasibility of an integrated monolithic beamformer Integrated Circuit (IC) that employs LO phase-shifting techniques through coupled oscillator array. Both of these systems (GPS receiver ICs and beamformers IC) were developed in IBM SiGe process that inherently provides radiation tolerance. Hence by integrating both of these technologies, Tahoe RF can uniquely provide a fully integrated, miniaturized, radiation hardened beam-steerable GPS frontend receiver system.

## Primary U.S. Work Locations and Key Partners



Miniaturized Radiation Hardened  
Beam-Steerable GPS Receiver  
Front End, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

# Miniaturized Radiation Hardened Beam-Steerable GPS Receiver Front End, Phase I

Completed Technology Project (2011 - 2011)



Organizations Performing Work	Role	Type	Location
Tahoe RF Semiconductor Inc.,	Lead Organization	Industry	Auburn, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

California	Maryland
------------	----------

## Project Transitions

**February 2011:** Project Start**September 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140189>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Tahoe RF Semiconductor Inc.,

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

Michael Shaw

### Co-Investigator:

Michael J Shaw

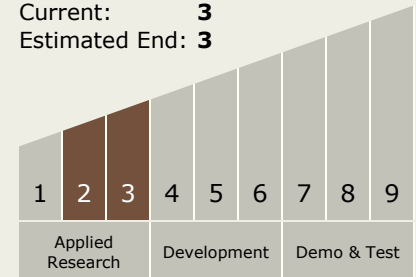
# Miniaturized Radiation Hardened Beam-Steerable GPS Receiver Front End, Phase I

Completed Technology Project (2011 - 2011)



## Technology Maturity (TRL)

Start: **2**  
Current: **3**  
Estimated End: **3**



## Technology Areas

### Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.4 Attitude Estimation Technologies
    - └ TX17.4.3 Attitude Estimation Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System